WHAT IS CLAIMED IS:

1. A process for producing a semiconductor substrate comprising steps of:

forming a nonporous monocrystalline semiconductor layer on a porous layer of a first substrate having the porous layer;

bonding the nonporous monocrystalline layer onto a second substrate;

separating the bonded substrates at the porous layer;

removing the porous layer on the second substrate; and

removing the porous layer constituting the first substrate.

2. A process for producing a semiconductor substrate, comprising steps of:

forming a nonporous monocrystalline semiconductor layer on a porous layer of a first substrate having the porous layer;

bonding the nonporous monocrystalline layer onto a second substrate with interposition of an insulative layer;

separating the bonded substrates at the porous layer;

removing the porous layer on the second substrate; and

removing the porous layer constituting the first substrate.

3. The process according to claim 1 or 2, wherein the porous layer is formed from silicon.

4. The process according to claim 1 or 2, wherein on the separated first substrate, after removal of the porous layer therefrom, a new porous layer is formed, and is employed repeatedly as the first substrate in the forming step of the nonporous monocrystalline semiconductor layer and subsequent steps.

5. The process according to claim 1 or 2, wherein the nonporous crystalline semiconductor layer is an Si layer.

6. The process according to claim 1 or 2, wherein the nonporous crystalline semiconductor layer is a compound semiconductor layer.

7. The process according to claim 1 or 2, wherein the first substrate is constituted from Si.

8. The process according to claim 1 or 2, wherein the second substrate is light-transmissive.

9. The process according to claim 1 or 2, wherein the step of removing the porous layer is conducted by etching.

10. The process according to claim 1 or 2, wherein the step of removing the porous layer is conducted by selective grinding of the porous layer by employing the nonporous monocrystalline semiconductor layer as a stopper.

11. The process according to claim 1 or 2, wherein the step of separating the bonded substrates at the porous layer is conducted by at least one of methods of application of a compression force to the substrate in a direction perpendicular to the bonding face of the substrate, application of a pulling force to the substrate in a direction perpendicular to the bonding face of the substrate, and application of a shear stress to the bonding face.

12. The process according to claim 2, wherein the insulative layer is formed on at least one of the nonporous monocrystalline layer and the surface of the second substrate.

13. The process according to claim 12, wherein the insulative layer is selected from thermal oxidation films, deposited SiO_2 films, and deposited Si_3N_4 films.

14. The process according to claim 1 or 2, wherein the step of bonding is conducted one or combination of anode coupling, compression, and heat treatment.

15. The process according to claim 1 or 2, wherein the porous layer is formed by anodization.

16. The process according to claim 1 or 2, wherein the anodization is conducted in an HF solution.

17. The process according to claim 1 or 2, wherein the step of separating the substrates at the porous layer is conducted by application of a wave energy.

18. The process according to claim 1 or 2, wherein the step of separating the substrates at the porous layer is conducted by inserting a separation member from an edge face of the porous layer thereinto.

19. The process according to claim 1 or 2, wherein the step of separating the substrates at the porous layer is conducted by expansion energy of a material impregnated into the porous layer.

20. The process according to claim 1 or 2, wherein the step of separating the substrates at the porous layer is conducted by selective etching at the edge face of the wafer.

21. The process according to claim 1 or 2, wherein the porosity of the porous layer ranges from 10 to 80 %.

22. A semiconductor substrate producing method comprising:

a porous-forming step for forming a porous Si layer on at least a surface of an Si substrate; and

a large porosity layer forming step for forming large porosity layer at a constant depth from a surface of said porous Si in said porous Si layer.

23. The semiconductor substrate producing method according to claim 22, wherein said large porosity layer forming step has an ion implanting step for implanting ions into said porous Si layer with a given projection range.

24. The semiconductor substrate producing method according to claim 23, further comprising a non-porous layer forming step for forming a non-porous layer on a surface of said porous layer before said ion implanting step.

25. The semiconductor substrate producing method according to claim 23, wherein said ions comprises at least one kind of noble gas, hydrogen and nitrogen.

26. The semiconductor substrate producing method according to claim 24, further comprising a bonding step for bonding said non-porous layer and a support substrate together; and a separating step for separating said Si substrate into two at said large porosity layer.

27. The semiconductor substrate producing method according to claim 26, wherein said separating step is performed by heat-treating said Si substrate.

28. The semiconductor substrate producing method according to claim 26, wherein said separating step is performed by pressurizing said Si substrate in a direction perpendicular to a surface thereof.

29. The semiconductor substrate producing method according to claim 26, wherein said separating step is performed by drawing said Si substrate in a direction perpendicular to a surface thereof.

30. The semiconductor substrate producing method according to claim 26, wherein said separating step is performed by applying a shearing force to said Si substrate.

31. The semiconductor substrate producing method according to claim 24, wherein said non-porous layer is made of single-crystal Si.

32. The semiconductor substrate producing method according to claim 24, wherein said non-porous layer is made of single-crystal Si having an oxidized Si layer on a surface to be bonded.

33. The semiconductor substrate producing method according to claim 24, wherein said non-porous layer is made of a single-crystal compound semiconductor.

34. The semiconductor substrate producing method according to claim 26, wherein said support substrate is an Si substrate.

35. The semiconductor substrate producing method according to claim 26, wherein said support substrate is an Si substrate having an oxidized Si layer on a surface to be bonded.

36. The semiconductor substrate producing method according to claim 26, wherein said support substrate is a light transmittable substrate

37. The semiconductor substrate producing method according to claim 26, wherein said bonding step is performed by anode bonding, pressurization, heat treatment or a combination thereof.

38. The semiconductor substrate producing method according to claim 26, further comprising a porous Si removing step, after said separating step, for removing the porous Si layer exposed on a surface of said support substrate and exposing said non-porous layer.

39. The semiconductor substrate producing method according to claim 38, wherein said porous Si removing step is performed by an electroless wet etching using at least one of hydrofluoric acid, a mixed liquid obtained by adding at least one of alcohol and hydrogen peroxide water to hydrofluoric acid, buffered hydrofluoric acid, and a mixed liquid obtained by adding at least one of alcohol and hydrogen peroxide water to buffered hydrofluoric acid.

40. The semiconductor substrate producing method according to claim 38, further comprising a flattening step for flattening a surface of said non-porous layer after said porous Si removing step.

41. The semiconductor substrate producing method according to claim 40, wherein said flattening step is performed by heat treatment in the atmosphere including hydrogen.

42. The semiconductor substrate producing method according to claim 26, wherein said porous-forming step forms porous Si layers on both sides of

said Si substrate, and said bonding step bonds two support substrates to said porous Si layer formed on both sides of said Si substrate.

43. The semiconductor substrate producing method according to claim 26, further comprising a second non-porous layer forming step, after said separating step, for forming non-porous layer again on the surface of said porous Si layer, and a second ion implanting step, after said second non-porous layer forming step, for implanting ions into said porous Si layer with a given projection range and forming large porosity layer in said porous Si layer.

44. The semiconductor substrate producing method according to claim 22, wherein said porous-forming step is performed by anodization.

45. The semiconductor substrate producing method according to claim 44, wherein said anodization is performed in an HF solution or a mixture of an HF solution and alcohol.

46. The semiconductor substrate producing method according to claim 22, wherein said large porosity layer forming step is performed by changing a current density of anodization in said porous-forming step.

47. A semiconductor substrate comprising:

a porous Si layer formed at a surface layer of an Si substrate; and

a large porosity layer formed in said porous Si layer wherein said large porosity layer exists in a region located at a constant depth from a surface of said porous Si layer.

48. The semiconductor substrate according to claim 47, wherein non-porous si layer exists on surface of said porous si layer, and electrodes are

formed on surface of said non-porous Si layer and on surface of said Si substrate, in order that said semiconductor substrate becomes an EL element.

49. A fabrication process of semiconductor substrate comprising:

a step of bonding a principal surface of a first substrate to a principal surface of a second substrate, said first substrate being an Si substrate in which at least one layer of non-porous thin film is formed through a porous Si layer;

a step of exposing said porous Si layer in a side surface of a bonding substrate comprised of said first substrate and said second substrate;

a step of dividing said bonding substrate in said porous Si layer by oxidizing said bonding substrate; and

a step of removing a porous Si and oxidized porous Si layer on said second substrate separated by the division of said bonding substrate in said porous Si layer.

50. A fabrication process of semiconductor substrate comprising:

a step of bonding a principal surface of a first substrate to a principal surface of a second substrate, said first substrate being an Si substrate in which at least one layer of non-porous thin film is formed through a porous Si layer and in which said porous Si layer is exposed in a side surface thereof;

a step of dividing said bonding substrate in said porous Si layer by oxidizing a bonding substrate comprised of said first substrate and said second substrate; and

a step of removing a porous Si and oxidized porous Si layer on said second substrate separated by the division of said bonding substrate in said porous Si layer.

51. The fabrication process of semiconductor substrate according to Claim 49 or Claim 50, wherein after removing the porous Si and oxidized porous Si layer on the first substrate separated by said division of the porous Si layer, the first substrate is again used as a raw material for said first substrate before bonding.

52. The fabrication process of semiconductor substrate according to Claim 49 or Claim 50, wherein after removing the porous Si and oxidized porous Si layer on the first substrate separated by said division of the porous Si layer, the first substrate is again used as a raw material for said second substrate before bonding.

53. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein at least one layer of non-porous thin film is formed through a porous Si layer on each of two principal surfaces of said first substrate and said second substrate is bonded to each of said two principal surfaces.

54. The fabrication process of semiconductor substrate according to Claim 49 or 50 wherein said non-porous thin film is a single-crystal Si layer.

55. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein said non-porous thin film comprises an oxidized Si layer and a single-crystal Si layer.

56. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein said non-porous thin film is a single-crystal compound semiconductor layer.

57. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein said second substrate is an Si substrate.

58. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein said second substrate is an Si substrate in which an oxidized Si film is formed at least on a principal surface to be bonded.

59. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein said second substrate is a light transparent substrate.

60. The fabrication process of semiconductor substrate according to Claim 53, wherein said second substrates respectively bonded to the two principal surfaces of said first substrate are those selected from Si substrate, Si substrate with an oxidized Si film formed at least on a principal surface to be bonded, and light transparent substrate.

61. The fabrication process of semiconductor substrate according to Claim 60, wherein the second substrate bonded to one principal surface of said first substrate and the second substrate bonded to the other principal surface thereof are made of respective materials different from each other.

62. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein a surface flattening process in a direction spreaded with the principal surface of the second substrate is carried out after removing said porous Si and oxidized porous Si layer.

63. The fabrication process of semiconductor substrate according to Claim 62, wherein said surface flattening process is annealing in an ambient containing hydrogen.

64. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein removal of said porous Si and oxidized porous Si layer is selectively carried out by soak in either one of hydrofluoric acid, a mixture solution in which at least one of alcohol and hydrogen peroxide solution is added to hydrofluoric acid, buffered hydrofluoric acid, and a mixture solution in which at least one of alcohol and hydrogen peroxide solution is added to buffered hydrofluoric acid.

65. The fabrication process of semiconductor substrate according to Claim 56, wherein removal of said porous Si and oxidized porous Si layer is carried out by selective chemical etching of porous Si with an etchant having a faster etch rate of porous Si against a compound semiconductor.

66. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein removal of said porous Si and oxidized porous Si layer is carried out by polishing the layer, using said non-porous thin film as a stopper.

67. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein bonding of said first substrate to said second substrate is making the substrates into close contact with each other.

68. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein bonding of said first substrate to said second substrate is carried out by a method selected from anodic bonding, pressing, annealing, and combinations thereof.

69. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein formation of the non-porous thin film on the

porous Si layer is carried out by performing anodization of an Si substrate to form porous Si and thereafter forming a non-porous thin film on said porous Si.

70. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein formation of the non-porous thin film on the porous Si layer is carried out by implanting ions of at least one element of rare gases, hydrogen, and nitrogen into an Si substrate to form a porous layer in a certain depth from a surface thereof.

71. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein formation of the non-porous thin film on the porous Si layer is carried out by anodizing an Si substrate to form a porous Si layer, thereafter forming a non-porous thin film on said porous Si layer, and then implanting ions of at least one element of rare gases, hydrogen, and nitrogen through the non-porous thin film into said porous Si layer so as to have a projected range thereof in said porous Si layer.

72. The fabrication process of semiconductor substrate according to Claim 69, wherein said anodization is carried out in an HF solution.

73. The fabrication process of semiconductor substrate according to Claim 49 or 50, wherein prior to the oxidation of said bonding substrate, a layer of a material having a smaller coefficient of thermal expansion than Si is formed on at least one of outer surfaces of said bonding substrate.

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